



NORTHWESTERN UNIVERSITY
TRANSPORTATION CENTER

Does the Demand Response to Transit Fare Increases Vary by Income?

Ian Savage and Caroline Miller

Why are we doing this?

- Mobility for lower income groups one of the justifications for subsidy
- Part of the political argument against fare increases, particular in flat-fare regimes
- But are lower-income groups actually more fare responsive?

What we are going to do

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- Look at change in boardings at non-downtown stations in the year after fare increases in 2004, 2006 and 2009
- See if ridership change varies in a systematic way with the per-capita income in the neighborhood around the station

Who are more fare sensitive?

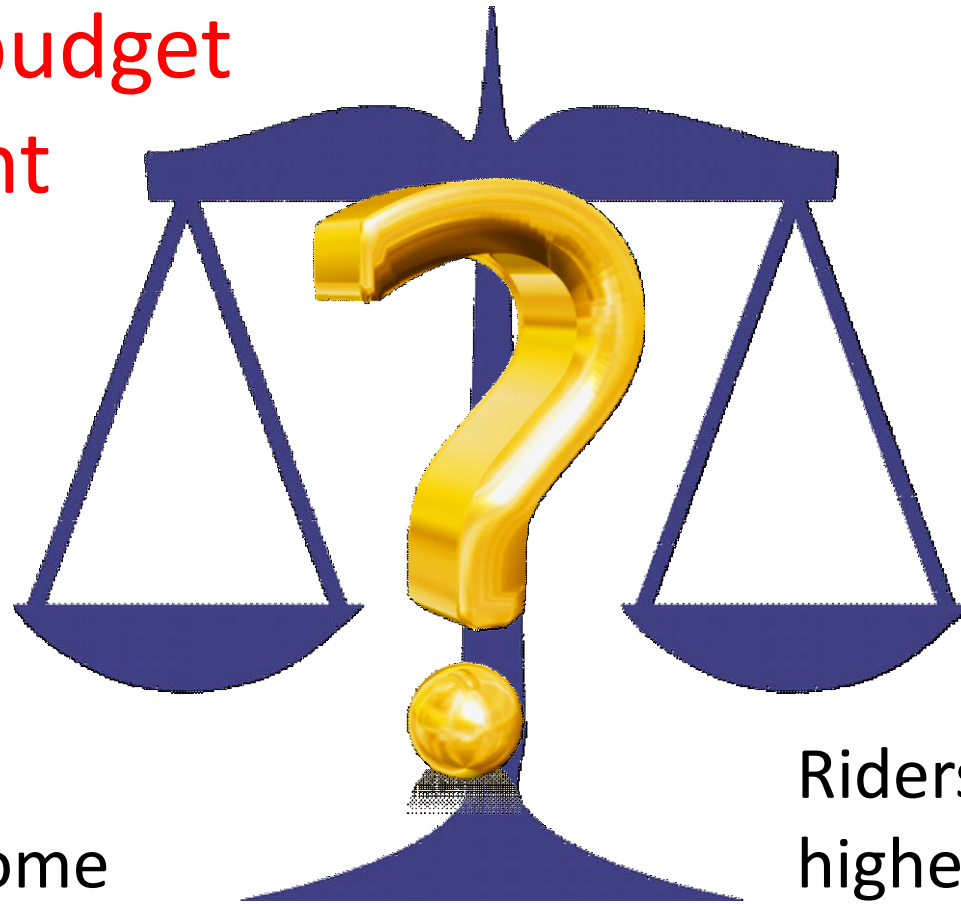


Riders in
lower-income
neighborhoods

Riders in
higher-income
neighborhoods

Who are more fare sensitive?

Tighter budget
constraint



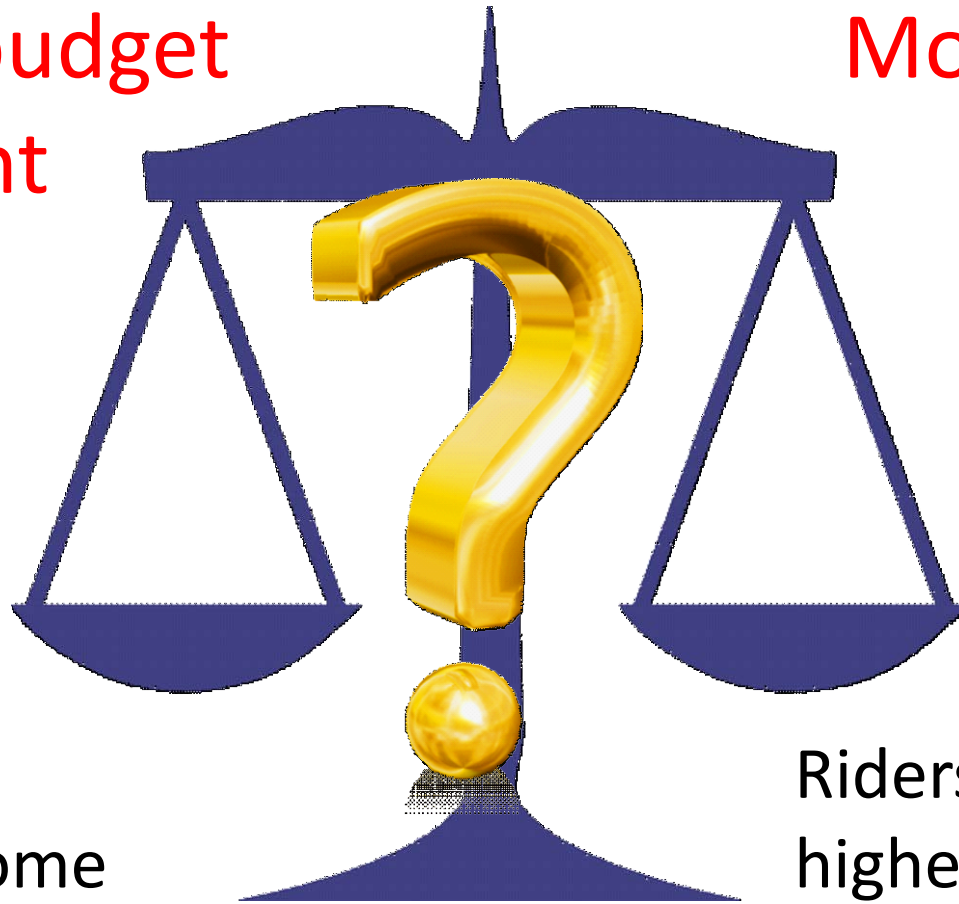
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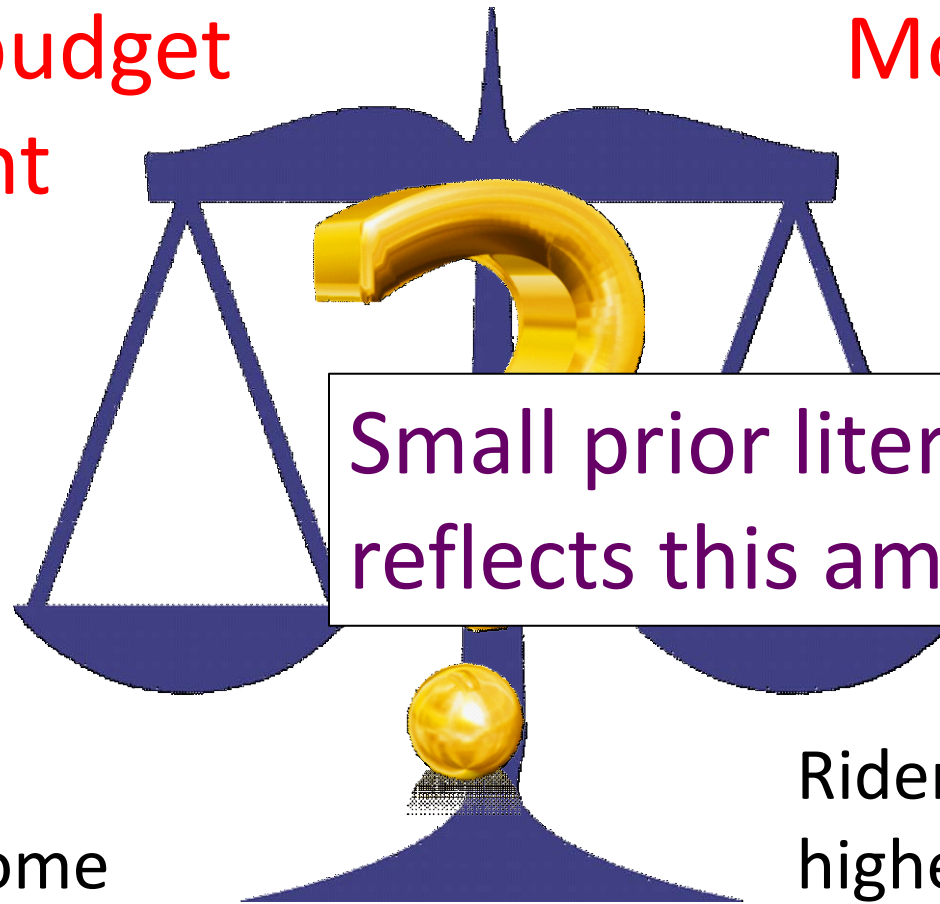
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Small prior literature
reflects this ambivalence

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Riders in
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- Looking at change in individual station entries in 12 months before and after a fare increase:
 - Jan-Dec 2004 versus Jan-Dec 2003
 - Jan-Dec 2006 versus Jan-Dec 2005
 - Apr-Dec 2009 versus Apr-Dec 2008 to allow for introduction of seniors ride free in March 2008

Also excluded:

Brown Line Branch

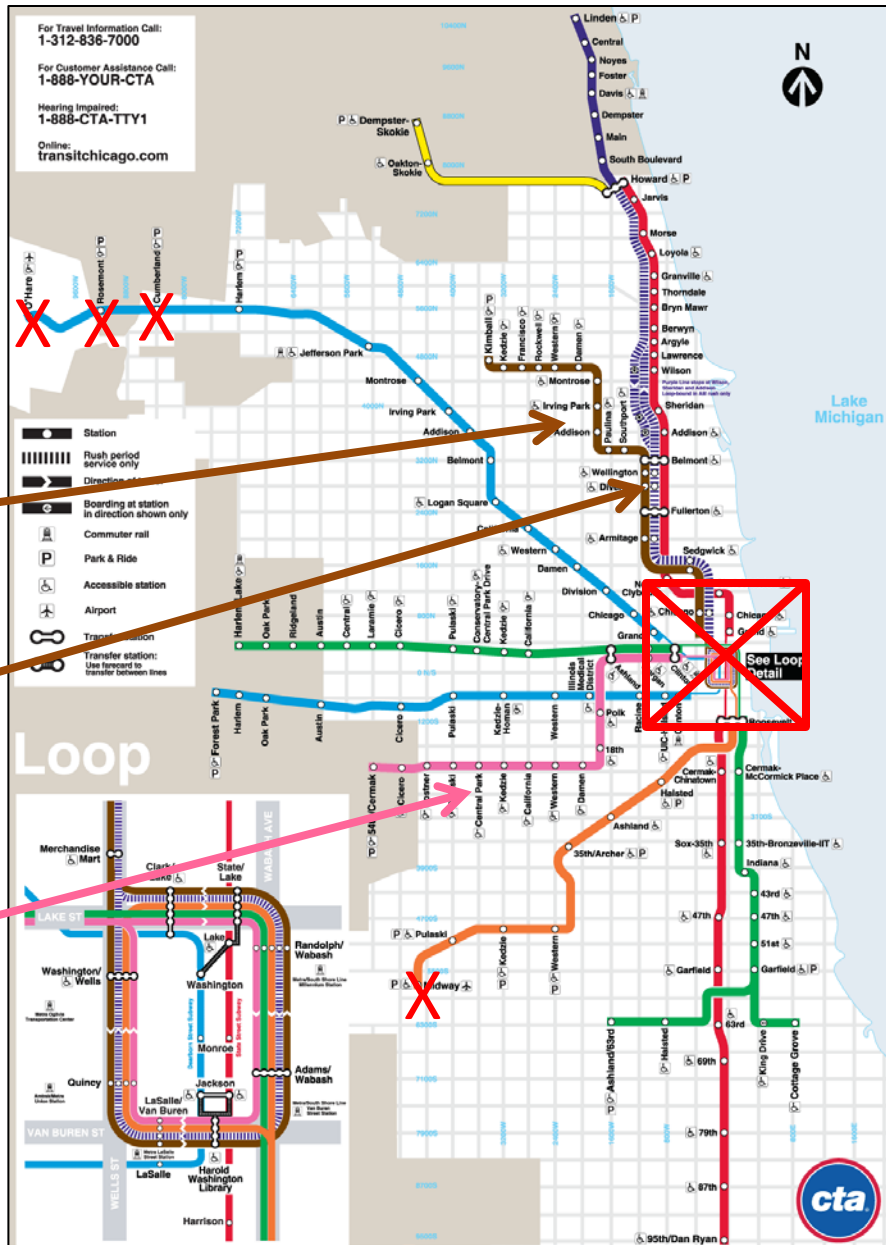
- 2005-2006
- 2008-2009

Fullerton to Belmont

- 2008-2009

Douglas Park Branch

- 2003-2004
- 2005-2006



Stations included on weekdays

2003-4: 99

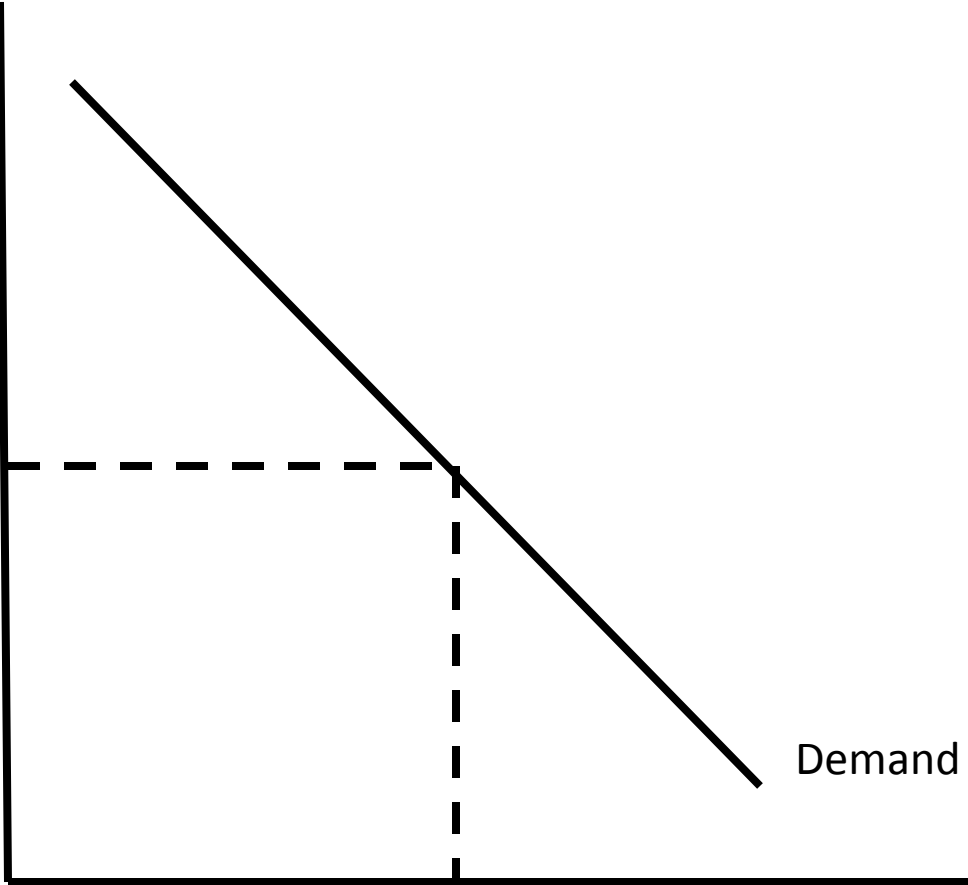
2005-6: 86

2008-9: 95

More than just fares changed

	Fares Increased	Employment Changed	Gas Prices Changed
2003-4	+12.3%	+0.7%	+17.4%
2005-6	+20.5%	+3.2%	+14.9%
2008-9	+11.8%	-4.8%	-27.7%

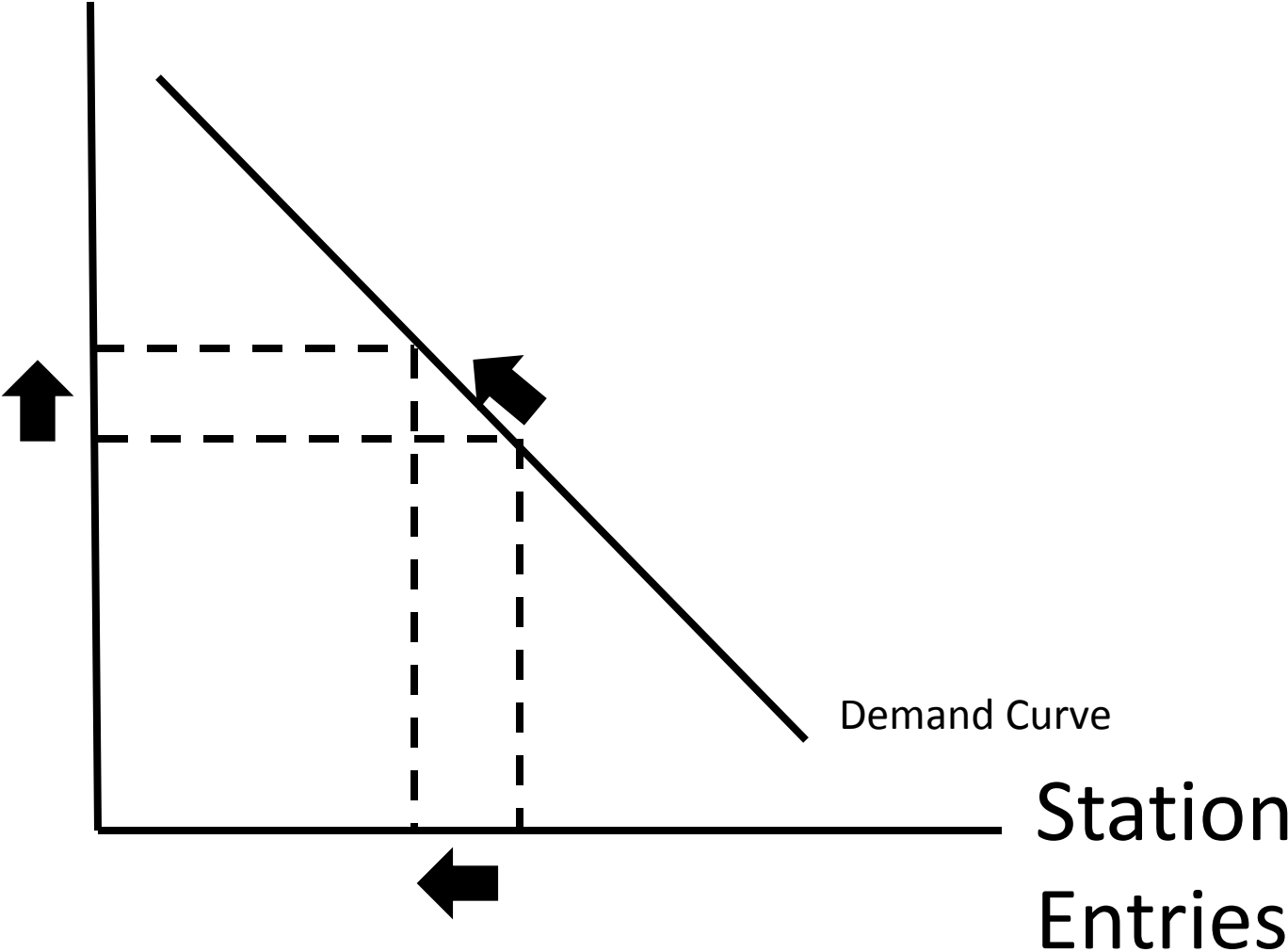
Fare (\$)



Demand Curve

Station
Entries

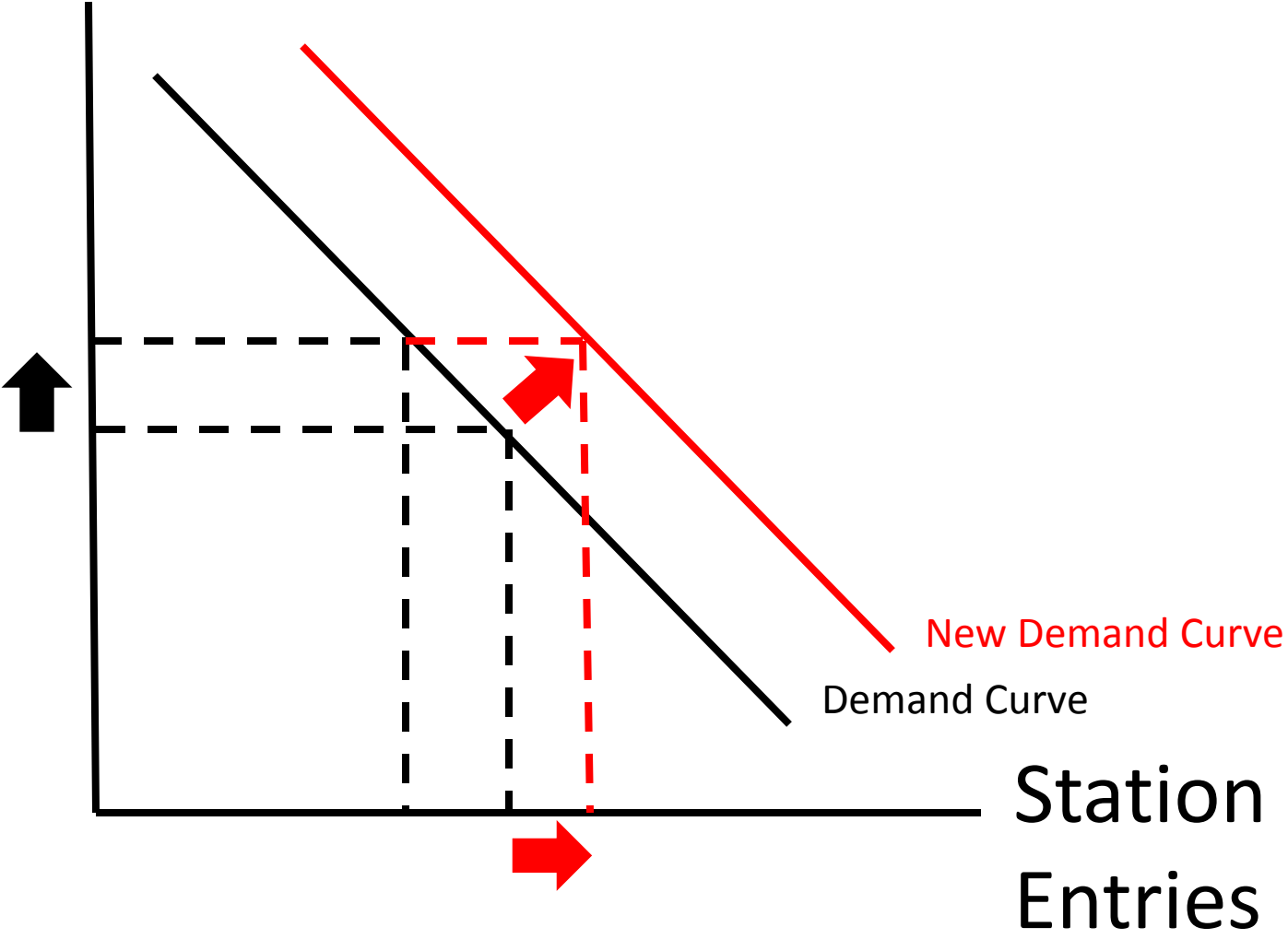
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Demand Curve

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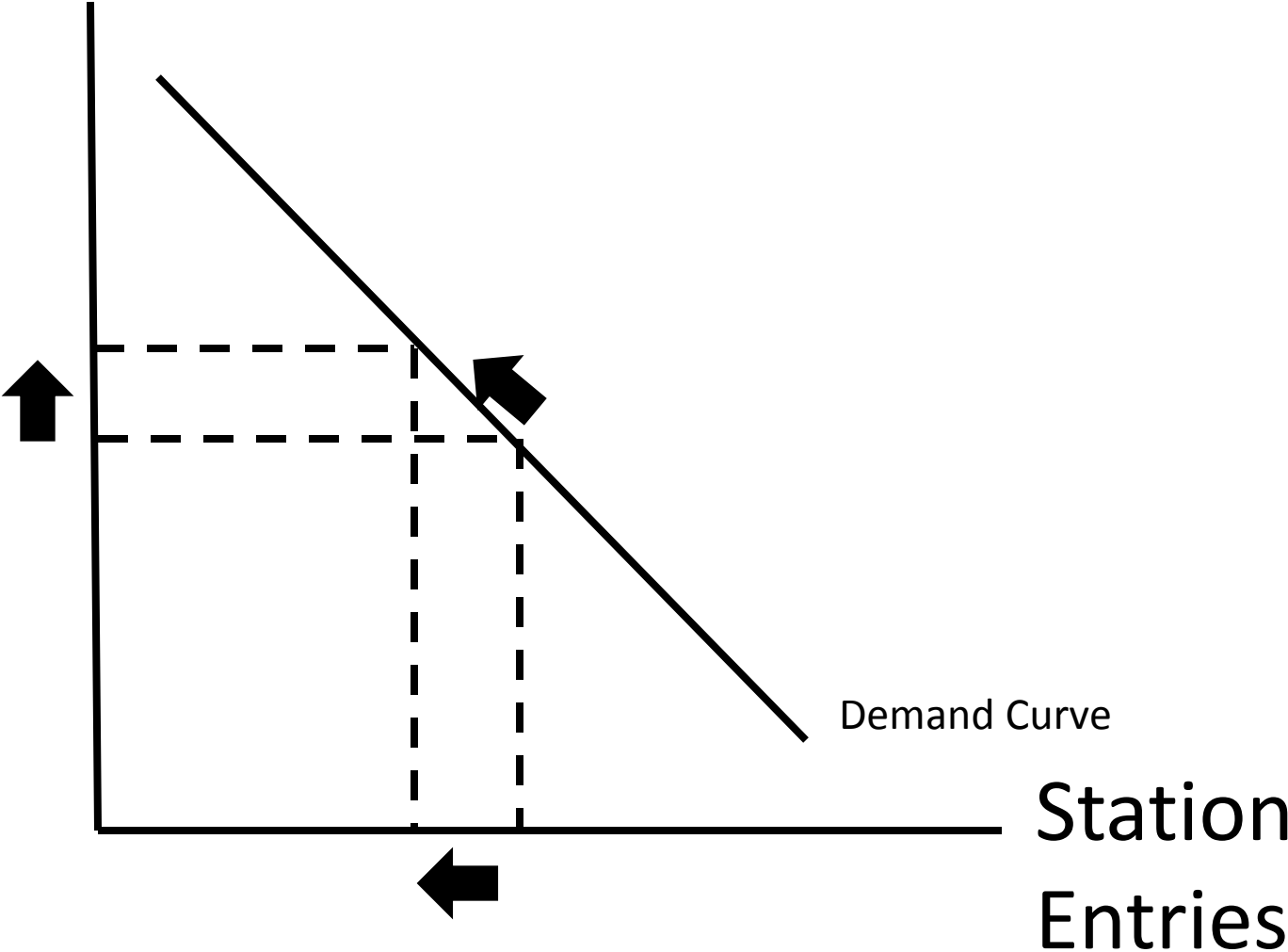


New Demand Curve

Demand Curve

Station
Entries

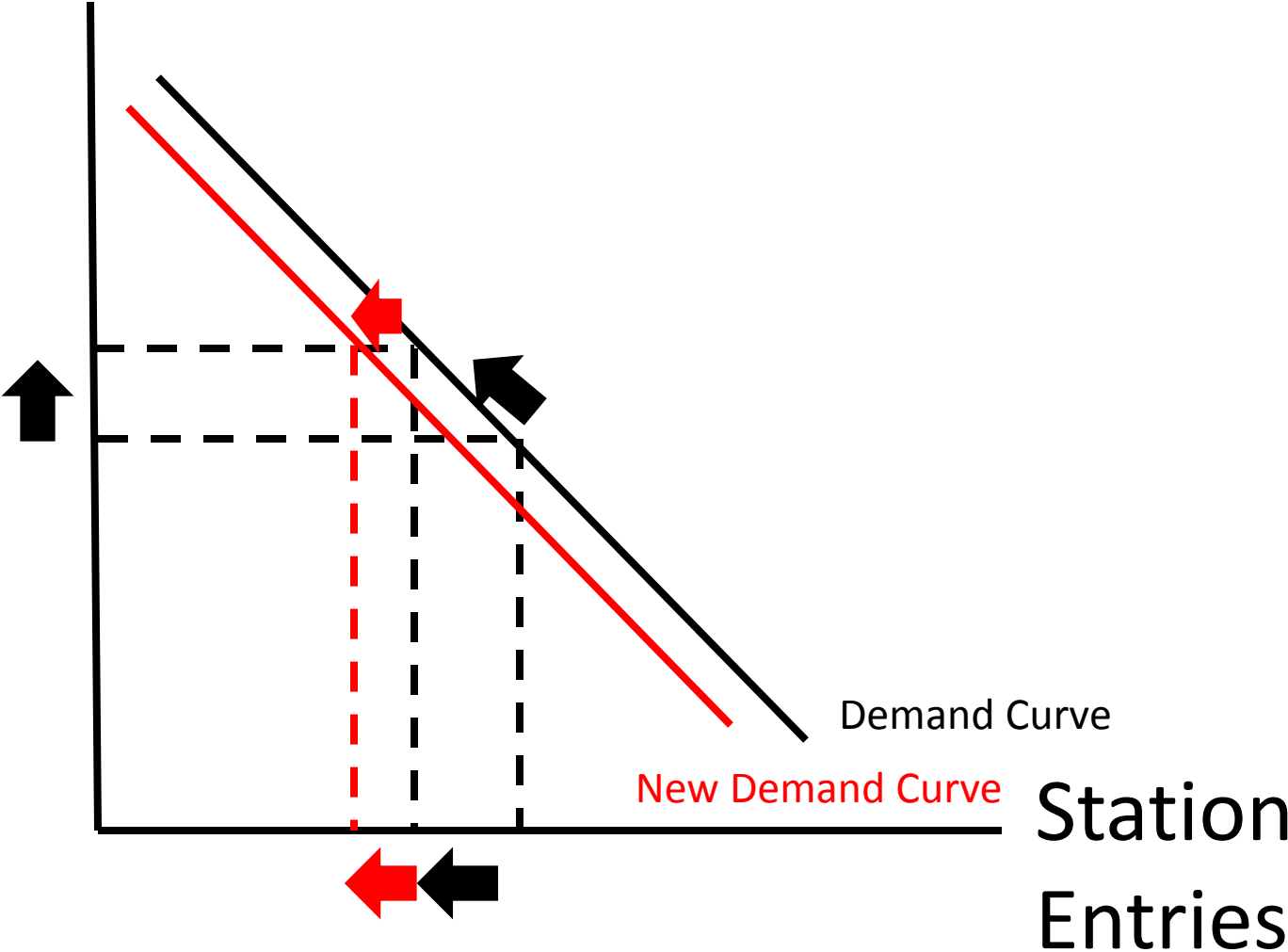
Fare (\$)



Demand Curve

Station
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Fare (\$)



Demand Curve

New Demand Curve

Station
Entries

Neighborhood data



- 2009 5-year (2005-9) American Community Survey
- Year 2000 Census Tracts
- Tracts that intersect half mile circle around each station
- For stations less than 1 mile apart, define a “watershed” halfway between them

Neighborhood data

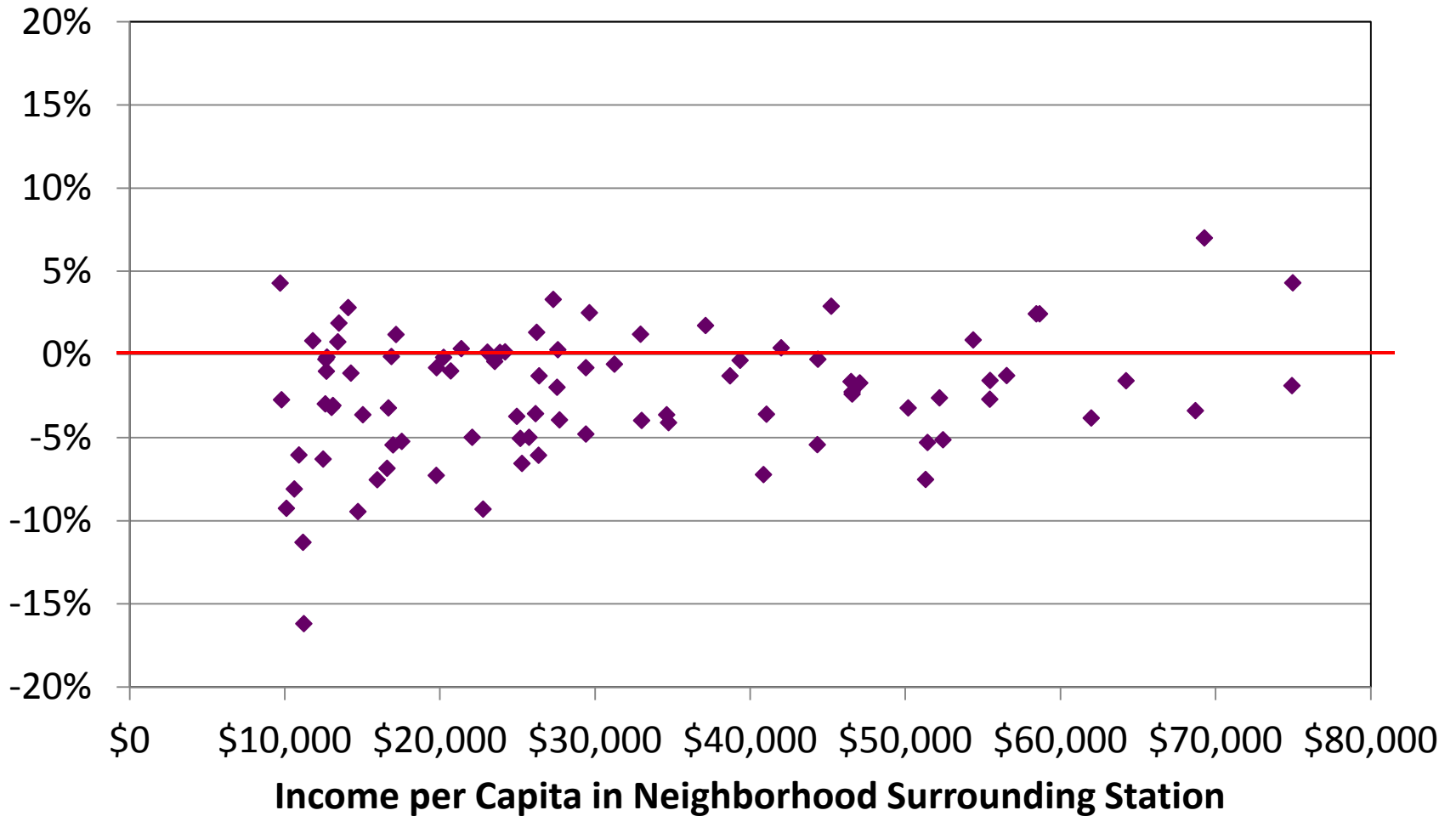
- Income per Capita
- Population density (persons per square mile)
- Distance from downtown (N. Michigan Av. / E. Lake St)
- Proportion of males
- Proportion of ages 65+
- Proportion of children (0 – 14)

Neighborhood data

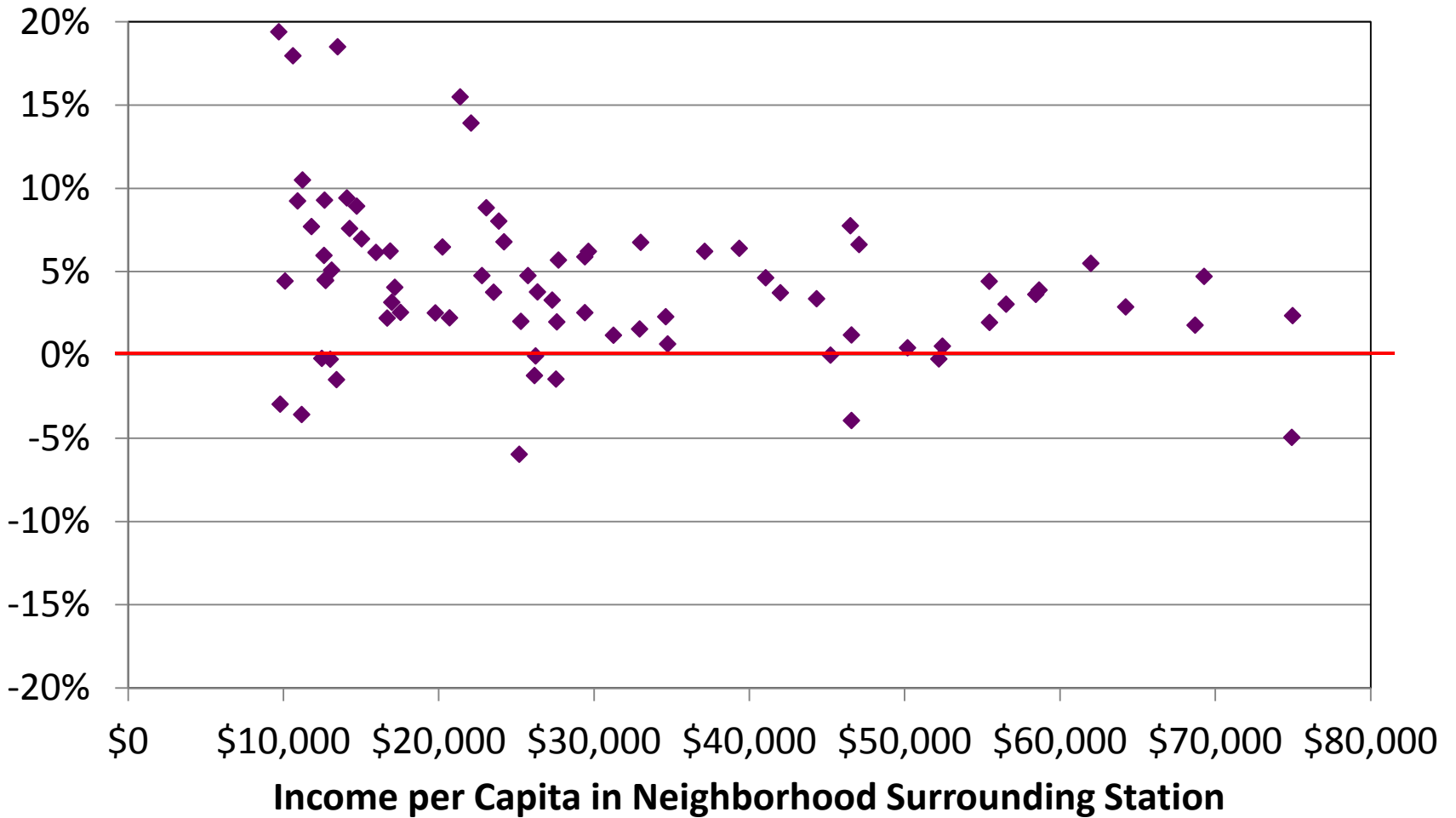
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Generally (and surprisingly) a low correlation between these variables

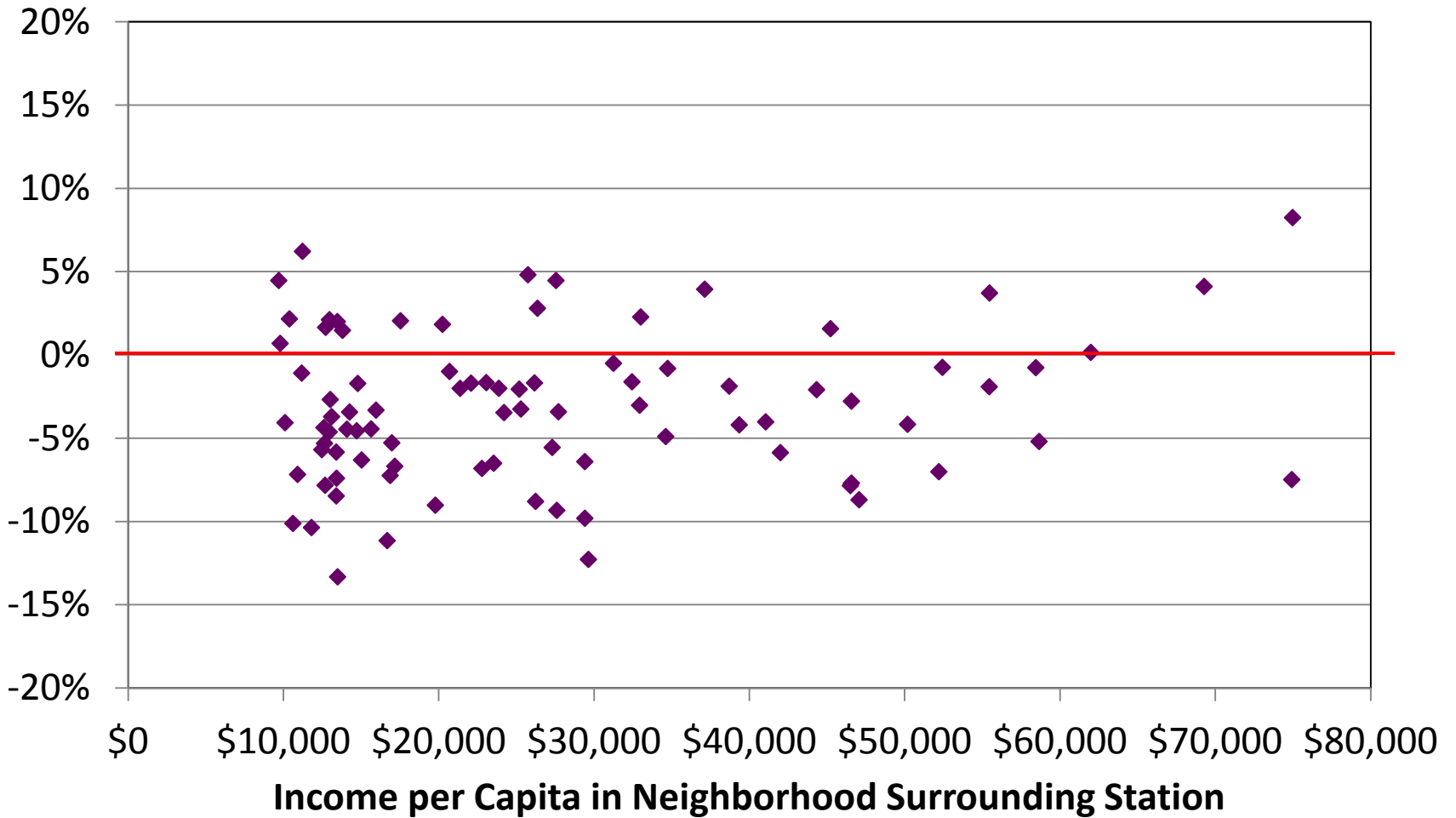
Weekday boardings 2003-04



Weekday boardings 2005-06



Weekday boardings 2008-09



Regression on change in boardings

	2003-4	2005-6	2008-9
Income per capita	+ve	-ve	+ve
Popn Density			+ve
Distance from CBD	-ve	-ve	-ve
% males			
% 65+			
% 0-14			

The bottom line

Weekday ridership change obtained from regression analysis holding population density, distance from downtown and proportions of males / seniors / kids at their mean values:

	Fares	Employment	Gas Prices	Income per capita	
				25 th percentile (\$14,000)	75 th percentile (\$42,000)
2003-4	+12.3%	+0.7%	+17.4%		
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2003-4	+12.3%	+0.7%	+17.4%	-3.5%	-1.5%
2005-6	+20.5%	+3.2%	+14.9%		
2008-9	+11.8%	-4.8%	-27.7%	-4.1%	-2.1%

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Take aways

- These results might support the ambivalence found in the prior literature
- Some support that lower-income neighborhoods had a greater (negative) response to fare increases on weekdays
- Of course, in a flat-fare system, continuing riders from lower-income groups suffer a greater budget hit

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